U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Dubautia waialealae*

COMMON NAME: Na`ena`e

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: July 2005

STATUS/ACTION:

___ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

___ New candidate

_X__ Continuing candidate

___ Non-petitioned

_X__ Petitioned - Date petition received: May 11, 2004

__ 90-day positive - FR date:

_X_ 12-month warranted but precluded - FR date: May 11, 2005

_N_ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded.

We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov).

___ Listing priority change

Former LP: ___

New LP: ___

Date when the species first became a Candidate (as currently defined): 1999

___ Candidate removal: Former LP: __

___ A – Taxon is more abundant or widespread than previously believed or not subject to

the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act's definition of "species."

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Asteraceae (Sunflower family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Kauai

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Kauai

LAND OWNERSHIP: The population with one individual occurs entirely on State-owned land, while the larger population occurs on both State and privately owned land.

LEAD REGION CONTACT: Paul Phifer, 503-872-2823, paul_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish & Wildlife Office, Christa Russell, 808-792-9400, christa_russell@fws.gov

BIOLOGICAL INFORMATION:

Species Description *Dubautia waialealae* is a shrub up to 2 meters (6.6 feet) tall. Leaves are alternate, spreading, linear-elliptic to lanceolate, 2.5 to 10 centimeters (1 to 4 inches) long, 5 to 17 millimeters (0.2 to 0.7 inches) wide, with both surfaces hispidulous. Fifteen (15) to 200 flowers are bourne in compact clusters 2 to 15 centimeters (0.8 to 6 inches) long, and 1.5 to 12 centimeters (6 to 5 inches) wide. Corollas are yellowish orange, 2 to 3 millimeters (0.08 to 0.12 inches) long, with 2 to 3 millimeters (0.08 to 0.12 inches) long ascending bristles. Achenes are 3 to 4 millimeters (0.12 to 0.16 inches) long, pilosulous above, and glabrate below (Carr 1999).

Taxonomy *Dubautia waialealae* was described by Rock (1910). This species is recognized as a distinct taxon by Carr (1999) and Wagner and Herbst (2003), the most recently accepted Hawaiian plant taxonomy.

Habitat Typical habitat is bog and diverse mesic to wet forest and on ridges at elevations between 600 and 1,150 meters (1,969 and 3,773 feet) (Carr 1999).

Historical and Current Range/Current Status This species was historically known only from the Waialeale summit of the Alakai Plateau on the island of Kauai. Currently, it is known from two

populations, one at the summit of Waialeale totaling less than 800 individuals and one individual at the opposite end of the Alakai Plateau (Gerry Carr, University of Hawaii, Botany Department, pers. comm. 1996; Loyal Mehrhoff, U.S. Fish and Wildlife Service (Service), pers. comm. 1996; Steve Perlman, National Tropical Botanical Garden, pers. comm. 1996; Marie Bruegmann, Service, pers. comms. 2004 and 2005).

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range. *Dubautia waialealae* is threatened by feral pigs (*Sus scrofa*) that adversely modify habitat (S. Perlman, pers. comm. 1996; M. Bruegmann, pers. comm. 2004 and 2005). As early as 1778, European explorers introduced livestock, which became feral, increased in number and range, and caused significant changes to the natural environment of Hawaii. Past and present activities of introduced alien mammals are the primary factor altering and degrading vegetation and habitats on Kauai. Feral ungulates trample and eat native vegetation and disturb and open areas.

This causes erosion and allows the entry of alien plant species (Cuddihy and Stone 1990; Wagner *et al*. 1999a).

The pig is originally native to Europe, northern Africa, Asia Minor, and Asia. European pigs, introduced to Hawaii by Captain James Cook in 1778, became feral and invaded forested areas, especially wet and mesic forests and dry areas at high elevations. They are currently present on Kauai and four other islands, and inhabit rain forests and grasslands. While rooting in the ground in search of the invertebrates and plant material they eat, feral pigs disturb and destroy vegetative cover, trample plants and seedlings, and threaten forest regeneration by damaging seeds and seedlings. They disturb soil and cause erosion, especially on slopes. Alien plant seeds are dispersed on their hooves and coats as well as through their digestive tracts, and the disturbed soil is fertilized by their feces, helping these plants to establish. Pigs are a major vector in the spread of many introduced plant species (Smith 1985; Stone 1985; Medeiros *et al*. 1986; Scott *et al*. 1986; Tomich 1986; Cuddihy and Stone 1990; Wagner *et al*. 1999a). Pigs have been fenced out of the bog where the one individual of *D. waialealae* currently occurs and the half of the larger population that occurs on State lands; however, on-going monitoring and maintenance of those fences will be necessary to prevent pig ingress from surrounding areas. In addition, the remaining unfenced individuals of this taxon are still impacted by this threat.

B. Overutilization for commercial, recreational, scientific, or educational purposes.
None known

C. Disease or predation.
Pig damage has been observed on at least ten percent of the entire remaining population at Waialeale summit. At this rate of damage, the remaining population was predicted to decline dramatically in the foreseeable future prior to fencing, which occurred in 2000 (G. Carr, pers. comm. 1996; M. Bruegmann, pers. comm. 2005). While approximately half of the larger population has been fenced and is currently stable, feral pigs still occasionally enter weak points in the fence between fence maintenance efforts, and can easily find and eat many plants before being found and removed (M. Bruegmann, pers. comms. 2004 and 2005).

D. The inadequacy of existing regulatory mechanisms.
The Forest Reserve Act of 1903 was an important action that protected watersheds in Hawaii. This act has been strengthened and re-titled Hawaii Department of Land and Natural Resources Title 13, Chapter 104 Rules Regulating Activities Within Forest Reserves and provides protection to native forest values from certain degrading factors caused by human activities. The Hawaii Department of Land and Natural Resources Regulation (Administrative Rule No. 1, Chapter 3) established the 4,022 hectare (9,939 acre) Alakai Wilderness Preserve in 1964, recognizing the pristine forest values of that area and the need to control potential degrading factors. No funding was obligated along with this law to allow Hawaii Department of Land and Natural Resources to adequately manage the area.

Pig hunting is allowed on all islands either year-round or during certain months, depending on the area (Hawaii Department of Lands and Natural Resources n.d.-a, n.d.-b, n.d.-c). Hunting is allowed within the Alakai Wilderness, but because of its remoteness and rugged topography, little public hunting is done in the areas where this species occurs. Pigs have been fenced out of the bog where the one individual of *D. waialealae* currently occurs and the half of the larger population that occurs on State lands; however, without continued monitoring and maintenance of those fences, pigs from surrounding areas can easily access fenced areas. In addition, the remaining unfenced individuals of this taxon are still impacted by this threat.

E. Other natural or manmade factors affecting its continued existence.
While introduced plant species are not as large a threat to *Dubautia waialealae* as feral pigs, there are a few species that are invading the bog habitat. Introduced plant species are minimal in the bog habitat, but will continue to increase if the fenced areas are not maintained (Perlman and Wood 1995; M. Bruegmann, pers. comm. 2005).

Juncus planifolius (no common name) is a perennial rush which has naturalized in moist, open, disturbed depressions on margins of forests and in bogs on Kauai, Oahu, Molokai, Maui, and Hawaii (Coffey 1999). *Juncus planifolius* is only found in disturbed areas, so the removal of feral pigs will most likely stem the spread of this species (Perlman and Wood 1995; S. Perlman, pers. comm. 1997). However, this species is prevalent in the Waialeale summit area, and may still compete with *Dubautia waialealae* until an effective and efficient method of control is determined (M. Bruegmann, pers. comms. 2004 and 2005).

Andropogon virginicus (broomsedge) is a perennial, tufted grass that is naturalized on Kauai, Oahu, and Hawaii along roadsides and in disturbed dry to mesic forest and shrubland (O'Connor 1999; Clyde Imada, Bernice Pauahi Bishop Museum, pers. comm. 1997). The saturation of soil in the bogs creates a lack of oxygen that inhibits the uptake of water by plant roots, resulting in drought conditions (Joan Canfield, Service, pers. comm. 1996). Broomsedge is beginning to establish in the bogs of the Alakai that are most easily accessible to humans and may become a threat to *Dubautia waialealae* if disturbance to the bogs continues (Perlman and Wood 1995).

The original native flora of Hawaii consisted of about 1,400 species, nearly 90 percent of which were endemic. Of the total native and naturalized Hawaiian flora of 1,817 taxa, 47 percent were introduced from other parts of the world, and nearly 100 species have become pests (Smith 1985;

Wagner *et al*. 1999a). Several studies (Cuddihy and Stone 1990; Wood and Perlman 1997; Robichaux *et al*. 1998) indicate nonnative plant species may outcompete native plants similar to *Dubautia waialealae*. Competition may be for space, light, water, or nutrients, or there may be a chemical inhibition of other plants (Smith 1985; Cuddihy and Stone 1990). In addition, nonnative pest plants found in habitat similar to that of this species have been shown to make the habitat less suitable for native species (Smathers and Gardner 1978; Smith 1985; Loope and Medeiros 1992; Medeiros *et al.* 1992; Ellshoff *et al.* 1995; Meyer and Florence 1996; Medeiros *et al.* 1997; Loope *et al*. 2004). In particular, alien pest plant species modify habitat by modifying availability of light, altering soil-water regimes, modifying nutrient cycling, or altering fire characteristics of native plant communities (Smith 1985; Cuddihy and Stone 1990; Vitousek *et al*. 1987). Because of demonstrated habitat modification and resource competition by nonnative plant species in habitat similar to habitat of *Dubautia waialealae*, the Service believes nonnative plant species are a threat to *Dubautia waialealae*. The remaining unmanaged populations of *Dubautia waialealae* are still impacted by this threat.

Nonnative plants are being controlled in the bog where the one individual of *D. waialealae* currently occurs and the half of the larger population that occurs on State lands, but will probably never be completely eradicated because new propagules are constantly being dispersed into the fenced area from surrounding, unmanaged lands. Many widespread alien taxa cannot be completely eradicated from Kauai, and therefore are expected to disperse into previously managed areas (Loope 1998, Smith 1985). The remaining portion of the population is still impacted by this threat.

With only two populations of *Dubautia waialealae* remaining, stochastic events, such as hurricanes, also threaten this plant (S. Perlman and K. Wood, pers. comms. 1996).

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

The Service worked in cooperation with the State of Hawaii, Division of Forestry and Wildlife to fence all of the bogs on state land in which *Dubautia waialealae* currently occurs. Funding was made available in fiscal year 1995 from the Service's Portland Regional Office and the fencing has been installed. Additional funding will be required for annual monitoring, fence maintenance, and weed control. The population of one individual and half of the larger population has been fenced, but the alien plants have not yet been completely controlled in either population.

SUMMARY OF THREATS

The major threats to *Dubautia waialealae* are pigs and nonnative plants, which are believed to be a major cause of the decline of this species throughout its range. Pigs have been fenced out of the bog where the one individual of *D. waialealae* currently occurs and the half of the larger population that occurs on State lands and nonnative plants are being controlled; however, without on-going monitoring and maintenance of those fences, pigs from surrounding areas can easily access fenced areas. In addition, the remaining unfenced individuals of this taxon are still impacted by these threats. With only two populations of *Dubautia waialealae* remaining (one with approximately 800 individuals and the other with only one individual) stochastic events, such as hurricanes, also threaten this plant.

LISTING PRIORITY:

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	**Imminent**	Monotypic genus	1
		Species	**2***
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:

This species is highly threatened by pigs that prey on it, and degrade and destroy habitat, by nonnative plants that outcompete and displace it, and by stochastic events. Threats to wet forest and bog habitat of *Dubautia waialealae* and to individuals of this species occur throughout its range, and are expected to continue or increase without their control or eradication. Pigs have been fenced out of the bog where the one individual of *D. waialealae* currently occurs and the half of the larger population that occurs on State lands and nonnative plants are being controlled; however, without on-going monitoring and maintenance of those fences, pigs from surrounding areas can easily access fenced areas. In addition, the remaining unfenced individuals of this taxon are still impacted by these threats. With only two populations of *Dubautia waialealae* remaining, stochastic events, such as hurricanes, also threaten this plant.

Imminence:

Threats to *Dubautia waialealae* from pigs and nonnative plants are imminent because they are ongoing. While pigs are currently fenced out of the population of one individual and half of the larger population, the other half (approximately 400 individuals) of the population is unfenced. In addition, the weeds have not been completely controlled in the fenced populations and there is no weed control in the unfenced portion of the larger population.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted?

No. The species does not appear to be appropriate for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. In addition, the smaller population (one individual) has been completely fenced and half of the larger population (approximately 400 individuals) has been fenced on State-owned lands. Biannual monitoring, weeding, and fence maintenance is conducted by the Service and the State's Division of Forestry and Wildlife and the larger population appears stable, even though all of the alien plant species have not been removed yet. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of *Dubautia waialealae* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

DESCRIPTION OF MONITORING:
Much of the information in this form is based on the results of a meeting of 20 botanical experts held by the Center for Plant Conservation in December of 1995, and has been updated with information from a 1995 survey of Kauai bogs by the National Tropical Botanical Garden.

We have incorporated information on this species from our files, including personal communications with Steve Perlman, National Tropical Botanical Garden in 1996 and 1997; Clyde Imada, Bernice Pauahi Bishop Museum in 1997, Gerry Carr, University of Hawaii Botany Department in 1996, Loyal Mehrhoff, Service in 1996, and Joan Canfield, Service in 1996. In addition, we have incorporated the most recent supplement to the *Manual of the Flowering Plants of Hawaii* (Wagner and Herbst 2003). In 2004, the Pacific Islands office contacted the following species experts: Bob Hobdy, retired from Hawaii Division of Forestry and Wildlife; Joel Lau, Hawaii Natural Heritage Program; Art Medeiros, U.S.G.S. Biological Resources Discipline; Hank Oppenheimer, resource manager for Maui Land and Pineapple Company; and Steve Perlman and Ken Wood, National Tropical Botanical Garden. New information was provided by Marie Bruegmann of the Service. In 2005, biannual monitoring of a portion of the population on State land was conducted by staff from the Service and Hawaii Division of Forestry and Wildlife (Service monitoring database 2005). In 2005 we contacted the species experts listed below and new information was provided by Marie Bruegmann (pers. comm. 2005).

On May 11, 2004, we received a petition dated May 4 from the Center for Biological Diversity (CBD) and others to list this species. This petition was thoroughly reviewed but did not provide any new information on this species (CBD *et al*. 2004). With the publication of the May 11, 2005 Candidate Notice of Review (50 FR 24870), we determined that the listing of this species was warranted by precluded by other, higher priority listing actions.

The Hawaii Natural Heritage Program lists this species as critically imperiled (Hawaii Natural Heritage Program Database 2004). Based on the International Union for Conservation of Nature and Natural Resources Red Plant Data Book rarity categories, this species is recognized as Rare (could be considered at risk) by Wagner *et al*. (1999b).

This level of monitoring is appropriate to update the status of the species, since the populations

are monitored in detail one to two times a year by the Service and Hawaii Division of Forestry and Wildlife and the results are included in this assessment.

COORDINATION WITH STATES

In October 2004 we provided the Hawaii Division of Forestry and Wildlife with copies of our most recent candidate assessments for their review and comment. Vickie Caraway, the State botanist, reviewed the information for this species and provided no additional information or corrections (V. Caraway, pers. comm. 2005).

LITERATURE CITED

List all experts contacted:

Name	Date	Place of Employment
1. Joel Lau	June 28, 2005	Hawaii Natural Heritage Program
2. Art Medeiros	June 28, 2005	U.S.G.S. Biological Resources Discipline
3. Jim Jacobi	June 28, 2005	U.S.G.S. Biological Resources Discipline
4. Rick Warshauer	June 28, 2005	U.S.G.S. Biological Resources Discipline
5. Hank Oppenheimer	June 28, 2005	Maui Land and Pineapple Company
6. Kapua Kawelo	June 28, 2005	U.S. Army
7. Dave Lorence	June 28, 2005	National Tropical Botanical Garden
8. Steve Perlman	June 28, 2005	National Tropical Botanical Garden
9. Ken Wood	June 28, 2005	National Tropical Botanical Garden
10. Marie Bruegmann*	July 13, 2005	U.S. Fish and Wildlife Service
11. Vickie Caraway	June 14, 2005	Hawaii Division of Forestry and Wildlife

*Provided new information on this taxon in 2005

List all databases utilized:

Name	Date
1. Hawaii Natural Heritage Program	2004
2. U.S. Fish and Wildlife Service Kauai Bog monitoring database	2005

Other resources utilized:

Carr, G.D. 1999. *Dubautia*: *In* Wagner, W.L., D.R. Herbst, and S.H. Sohmer, Manual of the flowering plants of Hawai'i. University of Hawaii Press and Bishop Museum Press, Honolulu. Bishop Mus. Spec. Publ. 97: 292-308.

Center for Biological Diversity, Dr. Jane Goodall, Dr. E.O. Wilson, Dr. Paul Ehrlich, Dr. John Terborgh, Dr. Niles Eldridge, Dr. Thomas Eisner, Dr. Robert Hass, Barbara Kingsolver, Charles Bowden, Martin Sheen, the Xerces Society, and the Biodiversity Conservation Alliance. 2004. Hawaiian Plants: petitions to list as federally endangered species. May 4, 2004.

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Hawaii, Department of Land and Natural Resources. N.d.-b. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Molokai. Division of Forestry and Wildlife, Honolulu. 2 pp.

Hawaii, Department of Land and Natural Resources. N.d.-c. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Maui. Division of Forestry and Wildlife, Honolulu.2 pp.

Hawaii, Department of Land and Natural Resources. N.d.-d. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Kauai. Division of Forestry and Wildlife, Honolulu.

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Medeiros, A.C., L.L. Loope, P. Conant and S. McElvaney. 1997. Status, ecology, and management of the invasive plant, *Miconia calvescens* DC (Melastomataceae) in the Hawaiian Islands. Bishop Mus. Occas. Pap.48: 23-36.

Medeiros, A.C., L.L. Loope, T. Flynn, S.J. Anderson, L.W. Cuddihy, and K.A. Wilson. 1992. Notes on the status of an invasive Australian tree fern (*Cyathea cooperi*) in Hawaiian rain forests. American Fern Journal 82: 27-33.

Meyer, J.-Y. and J. Florence. 1996. Tahiti's native flora endangered by the invasion of *Miconia calvescens* D.C. (Melastomataceae). Journal of Biogeography 23: 775-781.

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Stone, C.P. 1985. Alien animals in Hawai`i's native ecosystems: toward controlling the adverse effects of introduced vertebrates: *In* Stone, C.P., and J.M. Scott (eds.), Hawai'i's Terrestrial Ecosystems: Preservation and Management. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 251-297.
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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all 12-month petition findings, additions of species to the candidate list, removal of candidate species, and listing priority changes.

Approve: Acting _____ 11/10/05
Regional Director, Fish and Wildlife Service Date

Concur: _____ August 23, 2006
Director, Fish and Wildlife Service Date

Do not concur: _____ _____
Director, Fish and Wildlife Service Date

Date of annual review: September 20, 2005
Conducted by: Marie M. Bruegmann, Pacific Islands FWO
Plant Recovery Coordinator

Comments:
PIFWO Review

Reviewed by: Christa Russell Date: September 21, 2005
Plant Conservation Program Leader

Gina Shultz Date: October 13, 2005
Assistant Field Supervisor,
Endangered Species

Patrick Leonard Date: October 13, 2005
Field Supervisor